ioThinx 4500 (45M) Module Series
User's Manual

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ioThinx 4500 (45M) Module Series User's Manual

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Safety Symbols

DANGER

Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a moderate-risk, potentially hazardous situation which, if not avoided.

CAUTION

Indicates a low-risk, potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTE Indicates a potential malfunction which, if not avoided, however, will not result in damage to property.

INFORMATION This information is important for preventing errors.

Table of Contents

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Preface

In this document, we explain the scope of and how to use this document.

The following topics are covered in this chapter:

- **Revision History**
- **Relevant Models**
- **Package Checklist**
- **How to Use This Device**
- **Safety Precautions**
- **Additional Resources**

Revision History

Version	Change	Date
V1.0	First Release	2018-11-09

Relevant Models

This document applies to the following 45M modules:

Model Name	Features	Operating Temp.
45MR-1600	16 DIs, 24 VDC, PNP	-20 to 60°C
45MR-1600-T	16 DIs, 24 VDC, PNP	-40 to 75°C
45MR-1601	16 DIs, 24 VDC, NPN	-20 to 60°C
45MR-1601-T	16 DIs, 24 VDC, NPN	-40 to 75°C
45MR-2404	4 relays, form A	-20 to 60°C
45MR-2404-T	4 relays, form A	-40 to 75°C
45MR-2600	16 DOs, 24 VDC, sink	-20 to 60°C
45MR-2600-T	16 DOs, 24 VDC, sink	-40 to 75°C
45MR-2601	16 DOs, 24 VDC, source	-20 to 60°C
45MR-2601-T	16 DOs, 24 VDC, source	-40 to 75°C
45MR-2606	8 DIs, 24 VDC, PNP; 8 DOs, 24 VDC, source	-20 to 60°C
45MR-2606-T	8 DIs, 24 VDC, PNP; 8 DOs, 24 VDC, source	-40 to 75°C
45MR-3800	8 AIs, 0 to 20 mA or 4 to 20 mA	-20 to 60°C
45MR-3800-T	8 AIs, 0 to 20 mA or 4 to 20 mA	-40 to 75°C
45MR-3810	8 AIs, -10 to 10 V or 0 to 10 V	-20 to 60°C
45MR-3810-T	8 AIs, -10 to 10 V or 0 to 10 V	-40 to 75°C
45MR-6600	6 RTDs	-20 to 60°C
45MR-6600-T	6 RTDs	-40 to 75°C
45MR-6810	8 TCs	-20 to 60°C
45MR-6810-T	8 TCs	-40 to 75°C
45MR-7820	potential distribution module	-20 to 60°C
45MR-7820-T	potential distribution module	-40 to 75°C

Package Checklist

The following items are in the product package.

- 1 x 45M module
- 1 x quick installation guide (printed)
- 1 x warranty card

How to Use This Device

45M modules cannot be used as standalone devices. The modules must be used with an ioThinx 45xx Series adapter. Refer to the ioThinx 45xx Series User's Manual for details.

Safety Precautions

Observe the following safety precautions when installing or using the devices discussed in this document:

DANGER

Never work on the device while the power source is switched on! Disconnect all power sources to the device before performing any installation, repair, or maintenance work.

DANGER

To avoid causing electrical arcs, be sure that all power sources have been disconnected before removing or replacing components. Electrical arcs can cause explosions in areas that contain flammable substances. This warning applies when:

- Connecting or disconnecting the removable terminal block.
- Connect or disconnecting the device from a field-site power source.

WARNING

Devices discussed in this document are sensitive to electrostatic discharge, which can cause internal damage to and/or affect normal operation of the devices. Observe the following precautions when handling a device:

- Before touching the device, touch a grounded object with your finger to discharge static electricity.
- Wear an approved grounding wristband.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the device in appropriate static-safe packaging when not in use.

WARNING

Check the voltage supplied by the power source. Make sure the voltage provided by the power source matches the voltage required by the device.

WARNING

Check the voltage or current of the sensors or loads. Make sure the voltage and/or current indicated on the sensors or loads corresponds to the specifications of your 45M module before you connect the device.

WARNING

Connect your device to an earthed ground.

CAUTION

Do not use the device if the device itself is already damaged. Replace defective or damaged devices to ensure that your devices function properly.

CAUTION

Do not attempt to repair the device yourself. If you device needs to be repaired, return the device to Moxa's customer service department. Attempting to repair the device yourself could invalidate the device's warranty.

Additional Resources

Refer to following documents for additional information.

- Datasheets for the following products:
  - ioThinx 4510 Series
  - ioThinx 4500 Series (45MR) Modules
- User's Manual for the following product:
  - ioThinx 4510 Series

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Product Overview

In this chapter, we give an overview of each of the 45M modules.

The following topics are covered in this chapter:

- **Technical Data**
  - Common Specifications
  - 45MR-1600 Specifications
  - 45MR-1601 Specifications
  - 45MR-2404 Specifications
  - 45MR-2600 Specifications
  - 45MR-2601 Specifications
  - 45MR-2606 Specifications
  - 45MR-3800 Specifications
  - 45MR-3810 Specifications
  - 45MR-6600 Specifications
  - 45MR-6810 Specifications
  - 45MR-7820 Specifications
- **Appearance**
  - Front View
  - Physical Dimensions
- **LED Indicators**

Technical Data

Common Specifications

Physical Characteristics

Connector: Removable Terminal block

Wiring: 18 to 24 AWG

Dimensions: 19.5 x 99.0 x 60.5 mm (0.77 x 3.90 x 2.38 in)

Installation: DIN-rail mounting

Environmental Limits

Operating Temperature:

Standard Models: -20 to 60°C (-4 to 140°F)

Wide Temp. Models: -40 to 75°C (-40 to 167°F)

45MR-1600 Specifications

Input/Output Interface

Digital Input Channels: 16

Isolation: 3k VDC or 2k Vrms

Digital Inputs

Sensor Type:

Dry Contact

Wet Contact (PNP)

Dry Contact:

On: short to FP+

Off: open

Wet Contact (DI to FP-):

On: 10 to 30 VDC

Off: 0 to 3 VDC

I/O Mode: DI or event counter

Note: Only the first 4 channels support event counter mode.

45MR-1601 Specifications

Input/Output Interface

Digital Input Channels: 16

Isolation: 3k VDC or 2k Vrms

Digital Inputs

Sensor Type:

Dry Contact

Wet Contact (NPN)

Dry Contact:

On: short to FP-

Off: open

Wet Contact (DI to FP+):

On: 10 to 30 VDC

Off: 0 to 3 VDC

I/O Mode: DI or event counter

Note: Only the first 4 channels support event counter mode.

45MR-2404 Specifications

Input/Output Interface

Relay Channels: 4

Isolation: 3k VDC or 2k Vrms

Relays

Type: Form A (N.O.) power relay

Contact Current Rating: Resistive load: 2 A @ 30 VDC, 250 VAC

Contact Resistance: 100 milli-ohms (max.)

Initial Insulation Resistance: 1000 mega-ohms (min.) @ 500 VDC

I/O Mode: Relay

45MR-2600 Specifications

Input/Output Interface

Digital Output Channels: 16

Isolation: 3k VDC or 2k Vrms

Digital Outputs

I/O Type: Sink

Voltage: 12/24 VDC

Current Rating: 500 mA per channel

Over-Voltage Protection: 45 VDC

Short-Circuit Protection: Supported

Over-Temperature Shutdown: 175°C (typical), 150°C (min.)

I/O Mode: DO or pulse output

Note: Only the first 4 channels support pulse output mode.

45MR-2601 Specifications

Input/Output Interface

Digital Output Channels: 16

Isolation: 3k VDC or 2k Vrms

Digital Outputs

I/O Type: Source

Voltage: 12/24 VDC

Current Rating: 500 mA per channel

Over-Voltage Protection: 45 VDC

Short-Circuit Protection: Supported

Over-Temperature Shutdown: 175°C (typical), 150°C (min.)

I/O Mode: DO or pulse output

Note: Only the first 4 channels support event counter mode.

45MR-2606 Specifications

Input/Output Interface

Digital Input Channels: 8

Digital Output Channels: 8

Isolation: 3k VDC or 2k Vrms

Digital Inputs

Sensor Type:

Dry Contact

Wet Contact (PNP)

Dry Contact:
On: short to FP+
Off: open
Wet Contact (DI to FP-):
On: 10 to 30 VDC
Off: 0 to 3 VDC
I/O Mode: DI or event counter
Note: Only the first 2 channels support event counter mode.

Digital Outputs

I/O Type: Source
Voltage: 12/24 VDC
Current Rating: 500 mA per channel
Over-Voltage Protection: 45 VDC
Short-Circuit Protection: Supported
Over-Temperature Shutdown: 175°C (typical), 150°C (min.)
I/O Mode: DO or pulse output
Note: Only the first 2 channels support event counter mode.

45MR-3800 Specifications

Input/Output Interface

Analog Input Channels: 8
Isolation: 3k VDC or 2k Vrms

Analog Inputs

I/O Type: Differential
Input Impedance: 120 ohms
I/O Mode: Current
Input Range:
0 to 20 mA
4 to 20 mA
4 to 20 mA (with burn-out detection)
Resolution: 16 bits

45MR-3810 Specifications

Input/Output Interface

Analog Input Channels: 8
Isolation: 3k VDC or 2k Vrms

Digital Outputs

I/O Type: Differential
Input Impedance: 10 mega-ohms (min.)
Protection:
Fault and over-voltage protection:
-35 to +35 VDC (power off)
-25 to +30 VDC (power on)
I/O Mode: Voltage
Input Range:
±10 VDC
0 to 10 VDC
Resolution: 16 bits

45MR-6600 Specifications

Input/Output Interface

RTD Channels: 6

Isolation: 3k VDC or 2k Vrms

Digital Outputs

Input Type:

PT50, PT100, PT200, PT500 (-200 to 850°C)

PT1000 (-200 to 350°C)

JPT100, JPT200, JPT500 (-200 to 640°C)

JPT1000 (-200 to 350°C)

NI100, NI200, NI500 (-60 to 250°C)

NI1000 (-60 to 150°C)

NI120 (-80 to 260°C)

Resistance of 310, 620, 1250, and 2200 ohms

Input Impedance: 625 kilo-ohms (min.)

Resolution: 0.1°C or 0.1 ohm

45MR-6810 Specifications

Input/Output Interface

Thermocouple Channels: 8

Isolation: 3k VDC or 2k Vrms

Digital Outputs

Sensor Type: J, K, T, E, R, S, B, N

Millivolt Type:

±19.532 mV

±39.062 mV

±78.126 mV

Input Impedance: 1 mega-ohms (min.)

Resolution: 16 bits

45MR-7820 Specifications

Input/Output Interface

Voltage Output Channels: 16

Isolation: 3k VDC or 2k Vrms

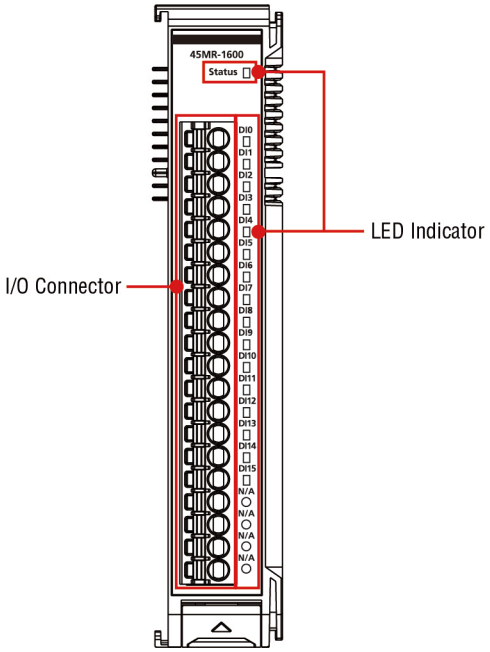
Note:

Field Power 12/24 VDC: 8 channels

Field Power 0 VDC: 8 channels

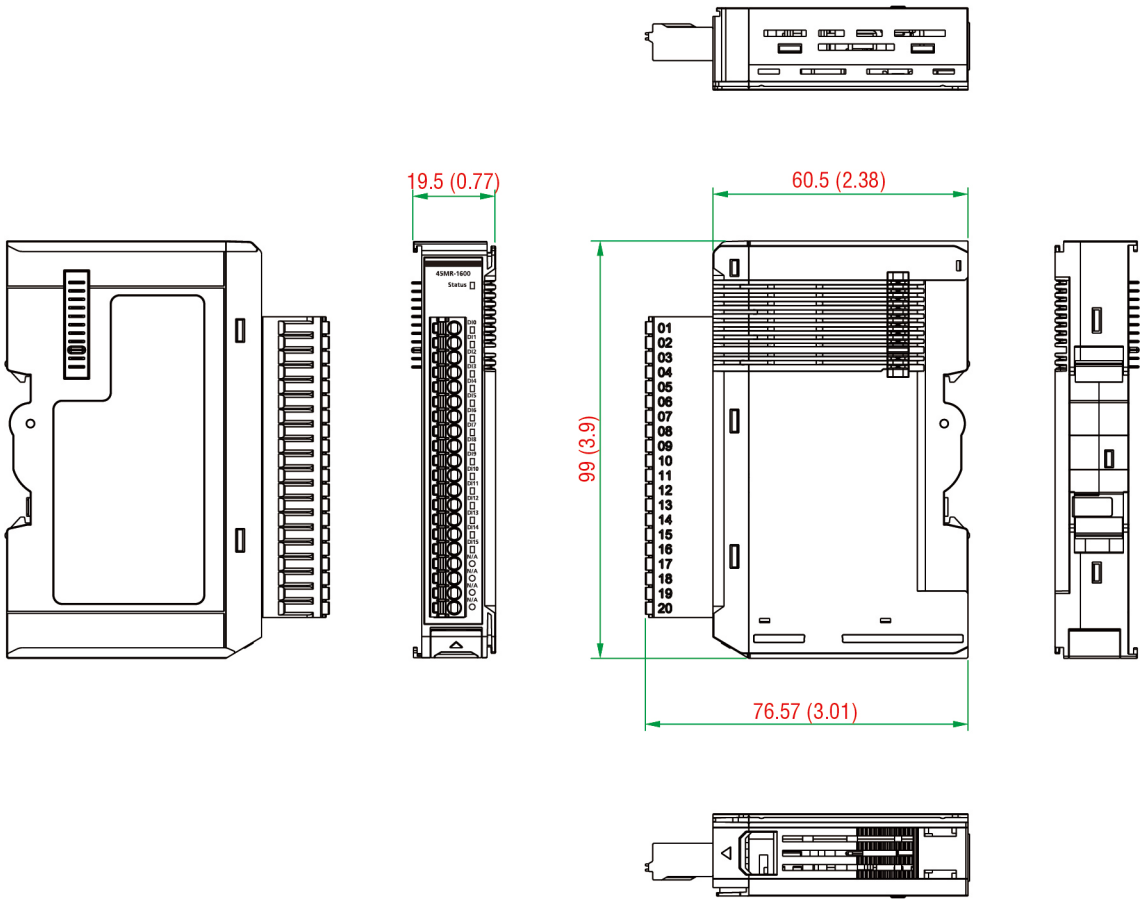
Appearance

Front View

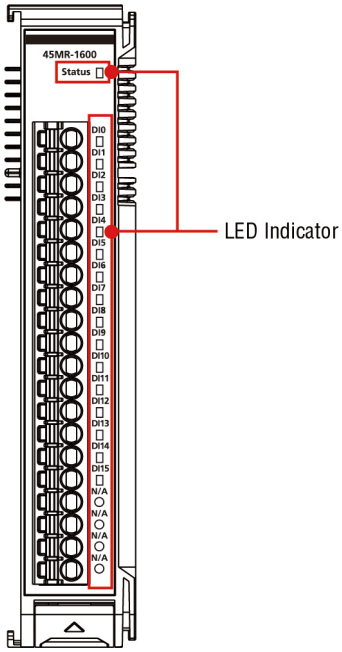


Physical Dimensions

Unit: mm (in)



LED Indicators



Label	Usage	No. of LEDs	LED Color	Description
Status	Status	1	Green	Steady on: Module Ready Slow blinking: Booting up, module mismatch, or installed incorrectly Fast blinking: Locating
			Red	Steady on: Module error Slow blinking: Firmware is upgrading Fast blink: Safe mode (output modules only)
DI0, DI1, DI2...	DI	1 of each	Green	Steady on: Channel on Off: Channel off or no counter/pulse signal
DO0, DO1, DO2...	DO	1 of each	Green	Steady on: Channel on Off: Channel off or no counter/pulse signal
RLY0, RLY1, RLY2...	Relay	1 of each	Green	Steady on: Channel on Off: Channel off or no counter/pulse signal
AI0, AI1, AI2...	AI	2 of each	Green	Steady on: Channel enabled
			Red	Steady on: Burn out & wire off when current mode
TCx	TC	2 of each	Green	Steady on: Channel enabled
			Red	Steady on: Burn out & wire off when current mode
RTD0, RTD2, RTD3...	RTD	2 of each	Green	Steady on: Channel enabled
			Red	Steady on: Burn out & wire off when current mode

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Hardware Installation

In this chapter, we describe how to install the 45M modules.

The following topics are covered in this chapter:

- **Wiring I/O**
  - I/O Terminal Blocks
  - 45MR-1600 (-T) Wiring Guide
  - 45MR-1601 (-T) Wiring Guide
  - 45MR-2404 (-T) Wiring Guide
  - 45MR-2600 (-T) Wiring Guide
  - 45MR-2601 (-T) Wiring Guide
  - 45MR-2606 (-T) Wiring Guide
  - 45MR-3800 (-T) Wiring Guide
  - 45MR-3810 (-T) Wiring Guide
  - 45MR-6600 (-T) Wiring Guide
  - 45MR-6810 (-T) Wiring Guide
  - 45MR-7820 (-T) Wiring Guide
- **Mounting the Module**
  - Installing the I/O Module on the DIN Rail
  - Unmounting the I/O Module from the DIN Rail

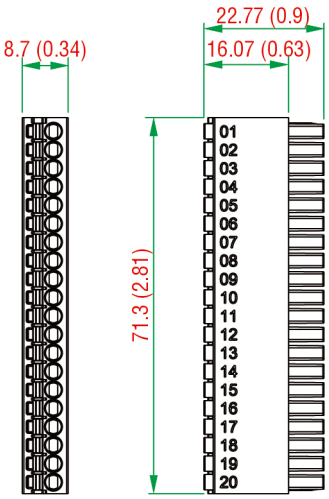
Wiring I/O

I/O Terminal Blocks

Wire range: 18 to 24 AWG

Wire strip length: 9 to 10 mm

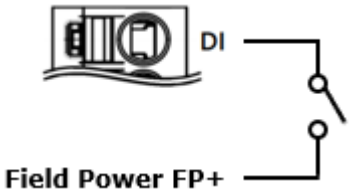
Unit: mm (in.)



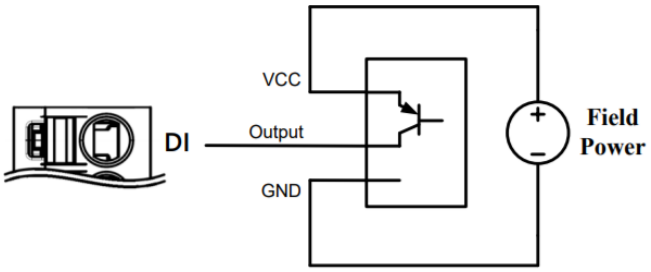
45MR-1600 (-T) Wiring Guide

Description: 16 DIs, 24 VDC, PNP or dry contact

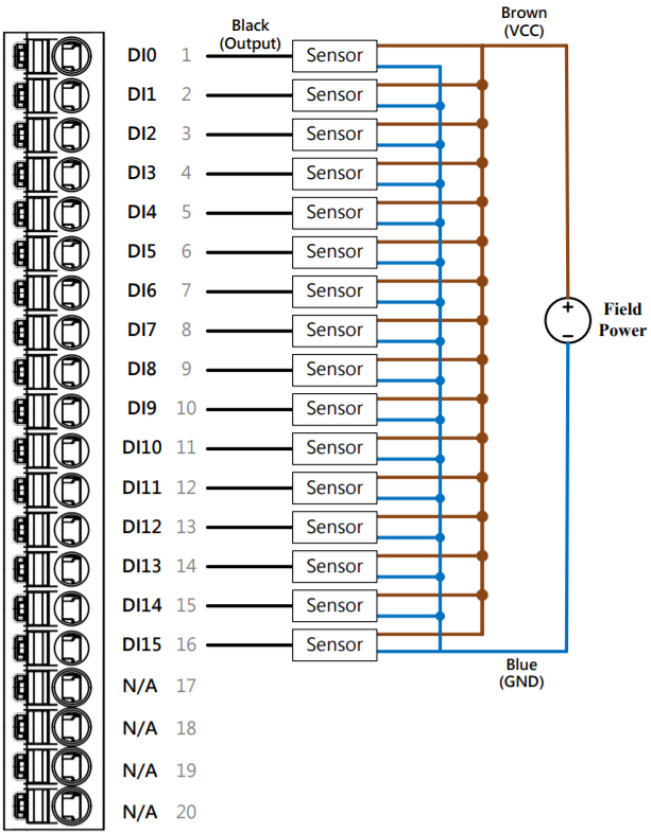
Single Channel (Dry Contact):



Single Channel (PNP):



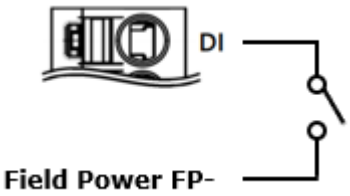
All Channels (PNP):



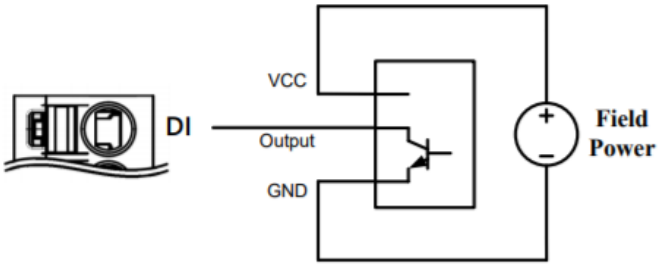
45MR-1601 (-T) Wiring Guide

Description: 16 DIs, 24 VDC, NPN or dry contact

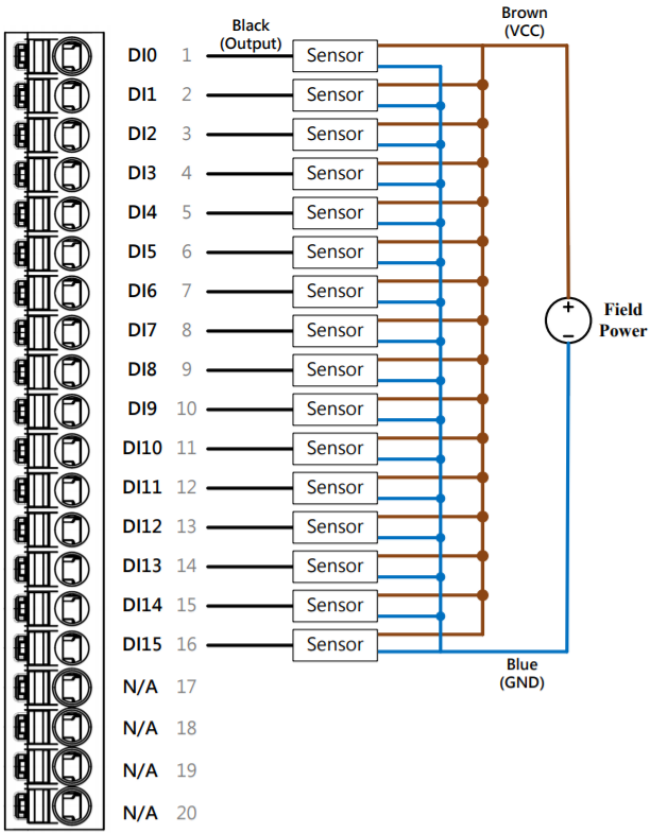
Single Channel (Dry Contact):



Single Channel (NPN):



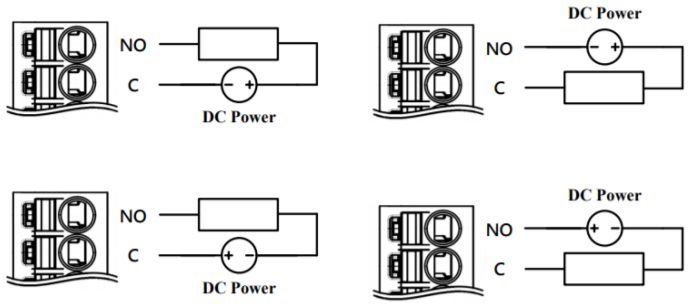
All Channels (NPN):



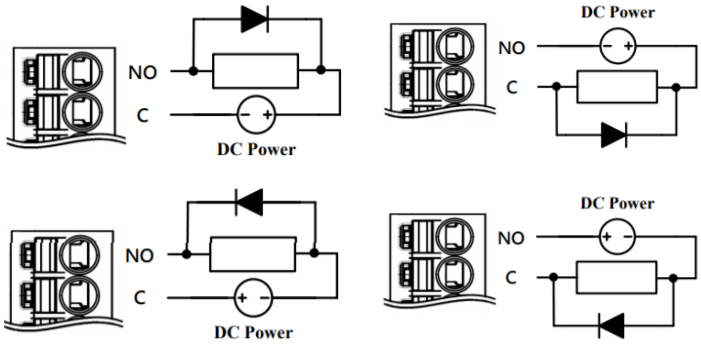
45MR-2404 (-T) Wiring Guide

Description: 4 Relays, form A

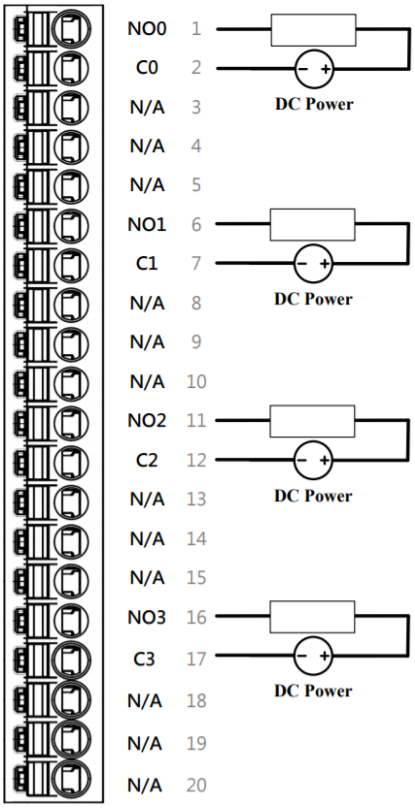
Single Channel (Resistive Load):



Single Channel (Inductive Load):



All Channels:

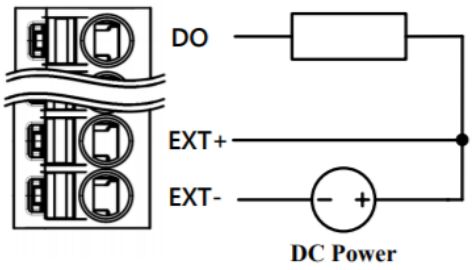


NOTE To avoid over current damage, fuse is recommended.

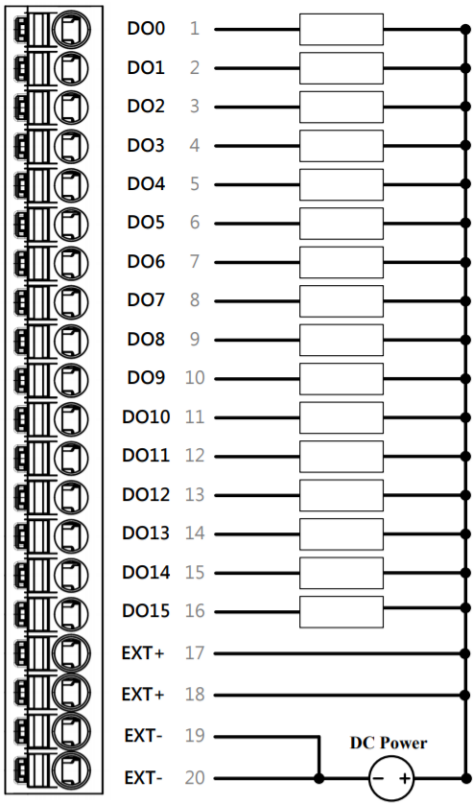
45MR-2600 (-T) Wiring Guide

Description: 16 DOs, 24 VDC, sink

Single Channel:



All Channels:

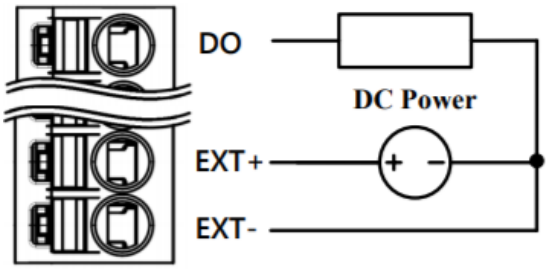


NOTE We recommend using a fuse to avoid damage from current spikes.

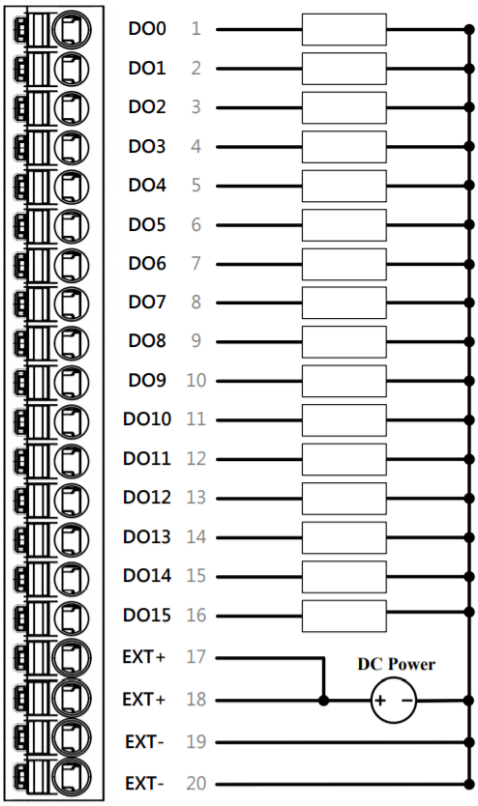
45MR-2601 (-T) Wiring Guide

Description: 16 DOs, 24 VDC, source

Single Channel:



All Channels:

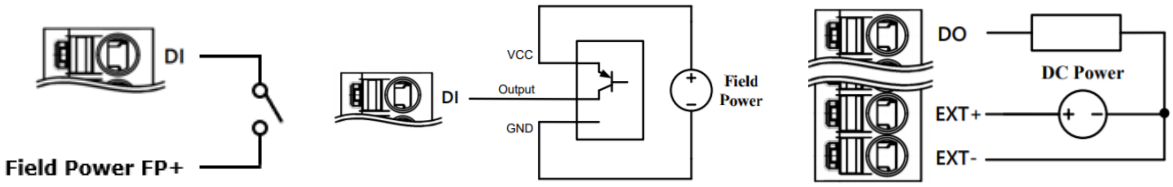


NOTE We recommend using a fuse to avoid damage from current spikes.

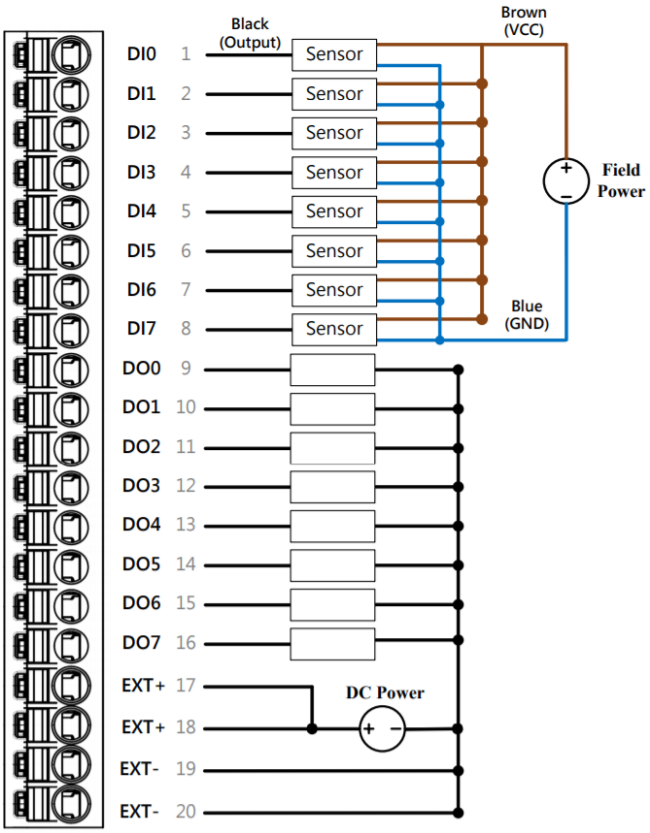
45MR-2606 (-T) Wiring Guide

Description: 8 DIs, 24 VDC, PNP or dry contact, 8 DOs, 24 VDC, source

Single Channel (DI dry contact/DI PNP/DO source):



All Channels:

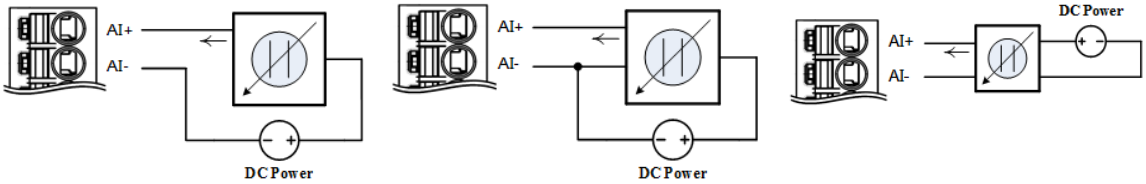


NOTE We recommend using a fuse to avoid damage from current spikes.

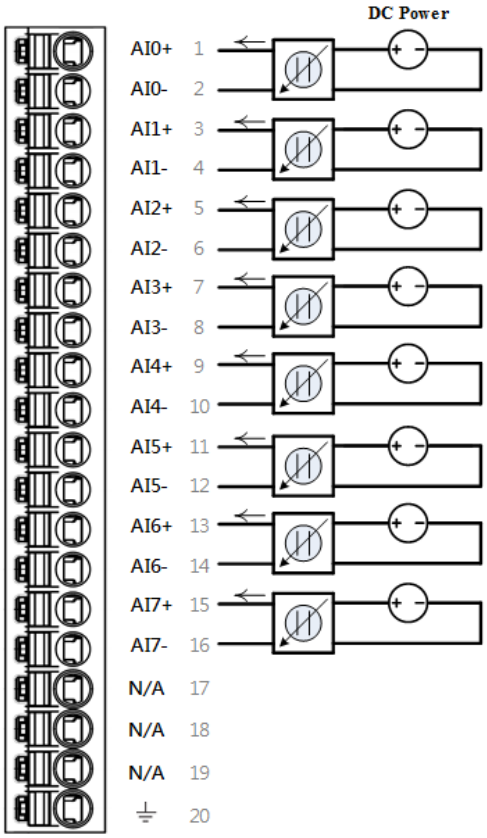
45MR-3800 (-T) Wiring Guide

Description: 8 AIs, 0 to 20 mA or 4 to 20 mA

Single Channel (2-wire/3-wire/4-wire):



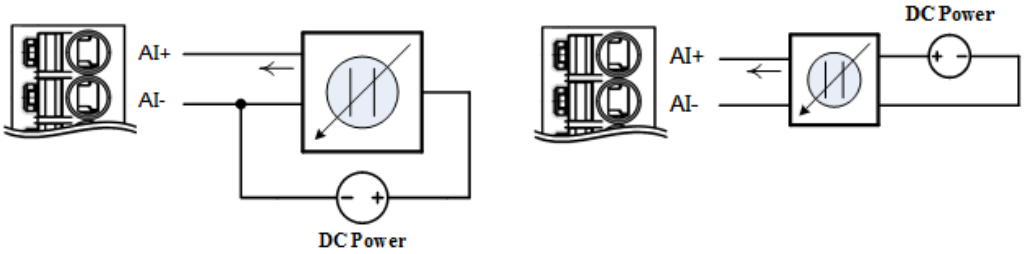
All Channels:



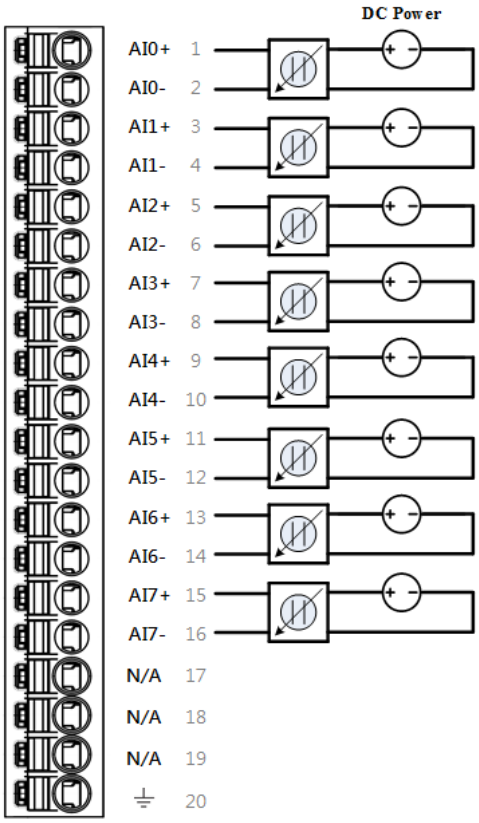
45MR-3810 (-T) Wiring Guide

Description: 8 AIs, -10 to 10 V or 0 to 10 V

Single Channel (3-wire / 4-wire):



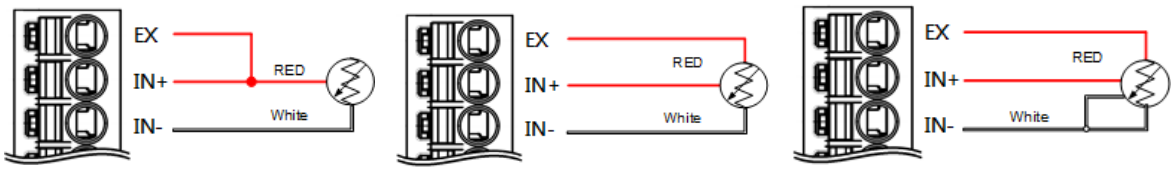
All Channels:



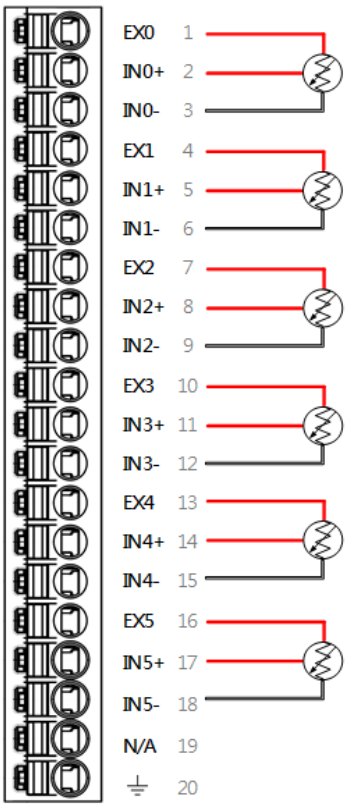
45MR-6600 (-T) Wiring Guide

Description: 6 RTDs

Single Channel (2-wire/3-wire/4-wire):



All Channels:

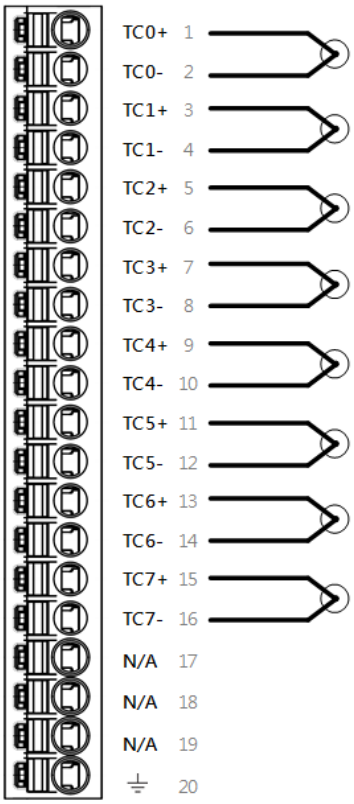


45MR-6810 (-T) Wiring Guide

Description: 8 TCs

Single Channel (TC Sensor / Voltage Source):

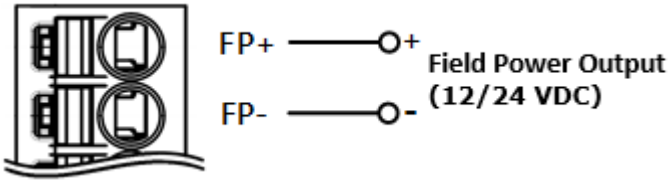
All Channels:



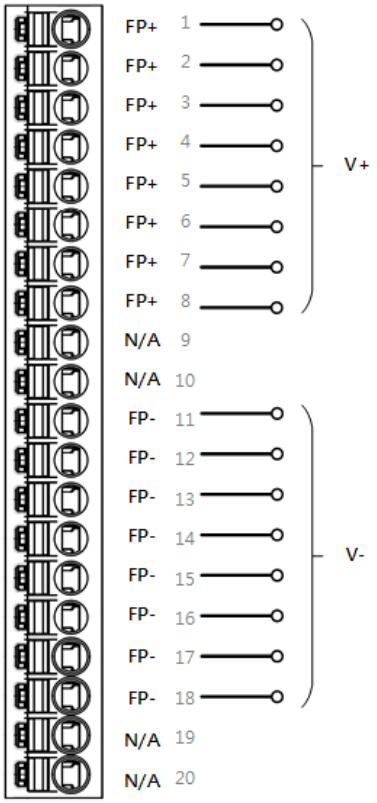
45MR-7820 (-T) Wiring Guide

Description: Potential distribution module

Single Channel:



All Channels:



Mounting the Module

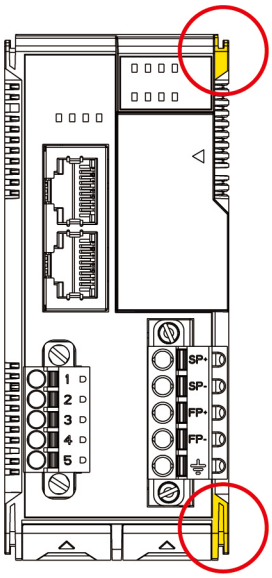
Take the following steps to mount the device on or unmount the device from a DIN rail.

DANGER

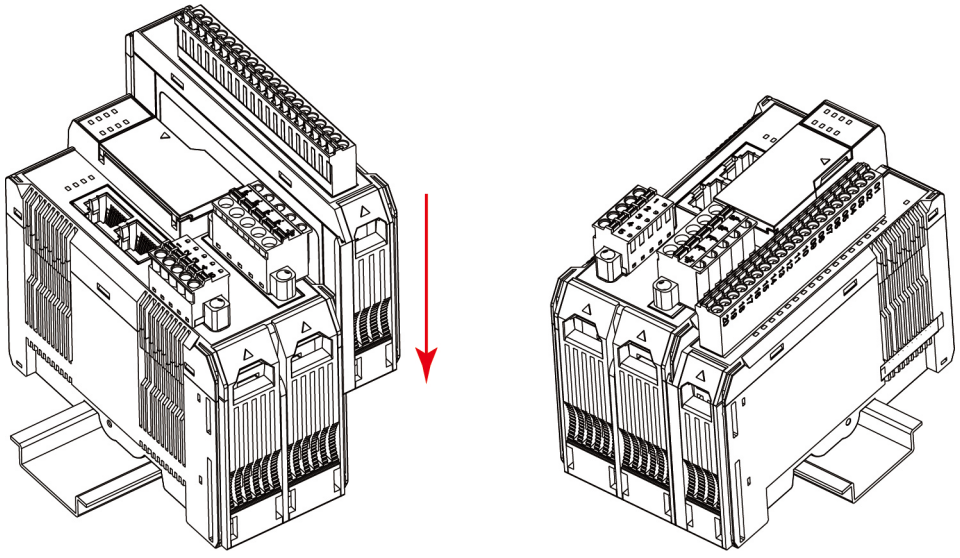
Never install the device when the power source is switched on!

Installing the I/O Module on the DIN Rail

Step 1: Align the I/O module side by side with the head/CPU module, making sure that the upper and lower rails are hooked together.



Step 2: Align the I/O module side by side with the network module and then push the I/O module until it touches the DIN-rail. Next, apply more force until the module clips to the DIN-rail.

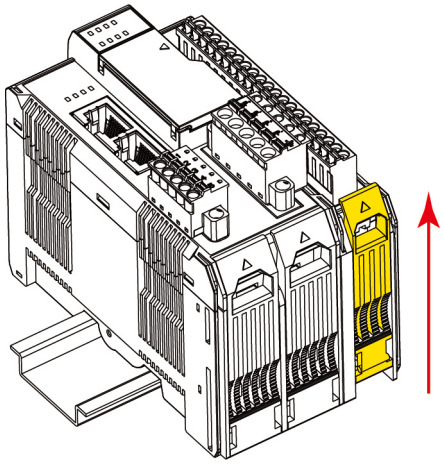


NOTE After the module is firmly attached to the DIN-rail, the module connections to the internal bus will be established.

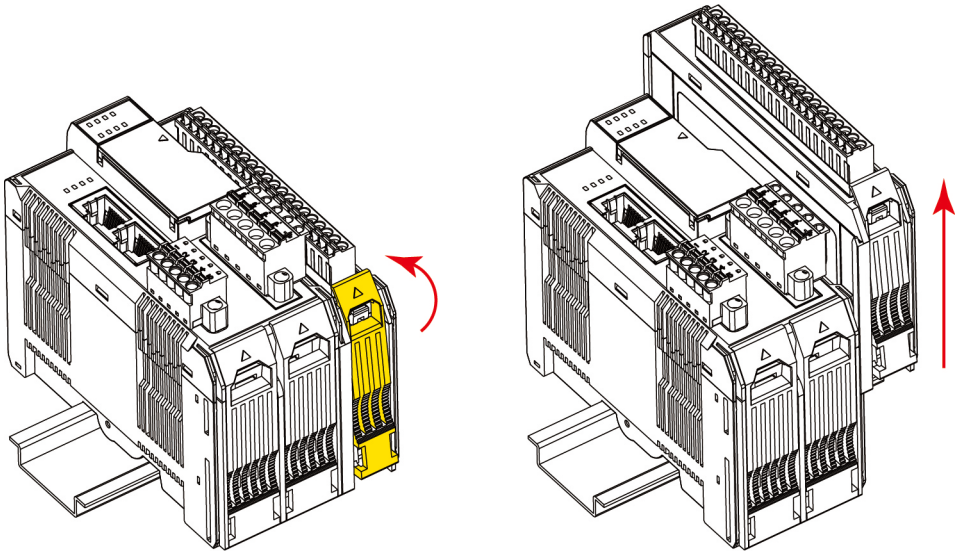
INFORMATION	With the I/O module inserted in place, the internal bus will establish a connection through the adjacent module(s).

Unmounting the I/O Module from the DIN Rail

Step 1: Use your finger to lift the release tab on the lower part of the module.



Step 2: Push the top of the release tab to latch it, and then pull the module out.



NOTE	Electrical connections for the internal bus will be disconnected when the I/O module is removed.